

Анализ файловой структуры UNIX. Команды для работы с файлами и каталогами

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Цели и задачи работы

Цель лабораторной работы

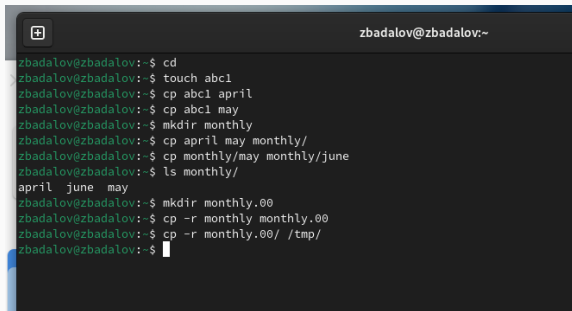
Ознакомление с файловой системой Linux, её структурой, именами и содержанием каталогов. Приобретение практических навыков по применению команд для работы с файлами и каталогами, по управлению процессами, по проверке использования диска и обслуживанию файловой системы.

Задачи лабораторной работы

- 1 Выполнить приимеры
- 2 Выполнить дествия по работе с каталогами и файлами
- 3 Выполнить действия с правами доступа
- 4 Получить дополнительные сведения при помощи справки по командам.

Процесс выполнения лабораторной работы

Выполнение примеров



```
zbadalov@zbadalov:~  
zbadalov@zbadalov:~$ cd  
zbadalov@zbadalov:~$ touch abc1  
zbadalov@zbadalov:~$ cp abc1 april  
zbadalov@zbadalov:~$ cp abc1 may  
zbadalov@zbadalov:~$ mkdir monthly  
zbadalov@zbadalov:~$ cp april may monthly/  
zbadalov@zbadalov:~$ cp monthly/may monthly/june  
zbadalov@zbadalov:~$ ls monthly/  
april  june  may  
zbadalov@zbadalov:~$ mkdir monthly.00  
zbadalov@zbadalov:~$ cp -r monthly monthly.00  
zbadalov@zbadalov:~$ cp -r monthly.00/ /tmp/  
zbadalov@zbadalov:~$
```

Рис. 1: Выполнение примеров

Выполнение примеров

```
zbadalov@zbadalov:~$  
zbadalov@zbadalov:~$ mv april july  
zbadalov@zbadalov:~$ mv july monthly.00/  
zbadalov@zbadalov:~$ ls monthly.00/  
july  monthly  
zbadalov@zbadalov:~$ mv monthly.00/ monthly.01  
zbadalov@zbadalov:~$ mkdir reports  
zbadalov@zbadalov:~$ mv monthly.01/ reports/  
zbadalov@zbadalov:~$ mv reports/monthly.01/ reports/monthly  
zbadalov@zbadalov:~$
```

Рис. 2: Выполнение примеров

Выполнение примеров

```
zbadalov@zbadalov:~$  
zbadalov@zbadalov:~$ cd  
zbadalov@zbadalov:~$ touch may  
zbadalov@zbadalov:~$ ls -l may  
-rw-r--r--. 1 zbadalov zbadalov 0 apr 31 09:42 may  
zbadalov@zbadalov:~$ chmod u+x may  
zbadalov@zbadalov:~$ ls -l may  
-rwxr--r--. 1 zbadalov zbadalov 0 apr 31 09:42 may  
zbadalov@zbadalov:~$ chmod u-x may  
zbadalov@zbadalov:~$ ls -l may  
-rw-r--r--. 1 zbadalov zbadalov 0 apr 31 09:42 may  
zbadalov@zbadalov:~$ cd  
zbadalov@zbadalov:~$ mkdir monthly  
mkdir: невозможно создать каталог «monthly»: Файл существует  
zbadalov@zbadalov:~$ chmod g-r,o-r monthly  
zbadalov@zbadalov:~$ cd  
zbadalov@zbadalov:~$ touch abc1  
zbadalov@zbadalov:~$ chmod g+w abc1  
zbadalov@zbadalov:~$
```

Рис. 3: Выполнение примеров

Создание директорий и копирование файлов

```
zbadalov@zbadalov:~$  
zbadalov@zbadalov:~$ cp /usr/include/linux/sysinfo.h ~  
zbadalov@zbadalov:~$ mv sysinfo.h equipment  
zbadalov@zbadalov:~$ mkdir ski.places  
zbadalov@zbadalov:~$ mv equipment ski.places/  
zbadalov@zbadalov:~$ mv ski.places/equipment ski.places/equiplist  
zbadalov@zbadalov:~$ touch abc1  
zbadalov@zbadalov:~$ cp abc1 ski.places/equiplist2  
zbadalov@zbadalov:~$ cd ski.places/  
zbadalov@zbadalov:~/ski.places$ mkdir equipment  
zbadalov@zbadalov:~/ski.places$ mv equiplist equipment/  
zbadalov@zbadalov:~/ski.places$ mv equiplist2 equipment/  
zbadalov@zbadalov:~/ski.places$ cd  
zbadalov@zbadalov:~$ mkdir newdir  
zbadalov@zbadalov:~$ mv newdir/ ski.places/  
zbadalov@zbadalov:~$ mv ski.places/newdir/ ski.places/plans  
zbadalov@zbadalov:~$
```

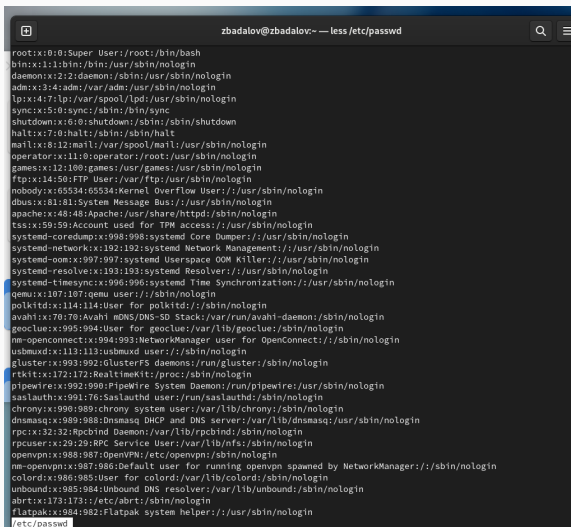
Рис. 4: Работа с каталогами

Работа с командой chmod

```
zbadalov@zbadalov:~$  
zbadalov@zbadalov:~$ mkdir australia play  
zbadalov@zbadalov:~$ touch my_os feathers  
zbadalov@zbadalov:~$ chmod 744 australia/  
zbadalov@zbadalov:~$ chmod 711 play  
zbadalov@zbadalov:~$ chmod 544 my_os  
zbadalov@zbadalov:~$ chmod 664 feathers  
zbadalov@zbadalov:~$ ls -l  
итого 0  
-rw-rw-r--. 1 zbadalov zbadalov 0 авг 31 09:46 abc1  
drwxr--r--. 1 zbadalov zbadalov 0 авг 31 09:50 australia  
-rw-rw-r--. 1 zbadalov zbadalov 0 авг 31 09:50 feathers  
drwxr-xr-x. 1 zbadalov zbadalov 74 авг 30 19:44 git-extended  
-rw-r--r--. 1 zbadalov zbadalov 0 авг 31 09:42 may  
drwx--x--x. 1 zbadalov zbadalov 24 авг 31 09:40 monthly  
-r-xr--r--. 1 zbadalov zbadalov 0 авг 31 09:50 my_os  
drwx--x--x. 1 zbadalov zbadalov 0 авг 31 09:50 play  
drwxr-xr-x. 1 zbadalov zbadalov 14 авг 31 09:49 reports  
drwxr-xr-x. 1 zbadalov zbadalov 28 авг 31 09:47 ski.places  
drwxr-xr-x. 1 zbadalov zbadalov 10 авг 30 18:23 work  
drwxr-xr-x. 1 zbadalov zbadalov 0 авг 30 18:15 Видео  
drwxr-xr-x. 1 zbadalov zbadalov 0 авг 30 18:15 Документы  
drwxr-xr-x. 1 zbadalov zbadalov 0 авг 30 18:15 Загрузки  
drwxr-xr-x. 1 zbadalov zbadalov 0 авг 30 18:15 Изображения  
drwxr-xr-x. 1 zbadalov zbadalov 0 авг 30 18:15 Музыка  
drwxr-xr-x. 1 zbadalov zbadalov 0 авг 30 18:15 Общедоступные  
drwxr-xr-x. 1 zbadalov zbadalov 0 авг 30 18:15 'Рабочий стол'  
drwxr-xr-x. 1 zbadalov zbadalov 0 авг 30 18:15 Шаблоны  
zbadalov@zbadalov:~$
```

Рис. 5: Настройка прав доступа

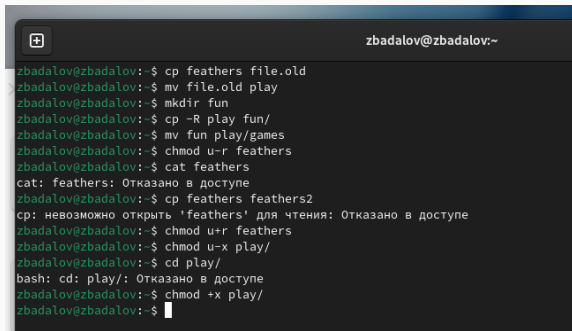
Файл /etc/passwd

A terminal window with a dark blue title bar. The title bar contains a plus icon on the left, the text 'zbadalov@zbadalov:~ — less /etc/passwd' in the center, and search and menu icons on the right. The terminal displays the contents of the /etc/passwd file, showing system users and regular users. The text is as follows:

```
root:x:0:0:Super User:/root:/bin/bash
bin:x:1:1:bin:/bin:/usr/sbin/nologin
daemon:x:2:2:daemon:/sbin:/usr/sbin/nologin
adm:x:3:4:adm:/var/adm:/usr/sbin/nologin
lp:x:4:7:lp:/var/spool/lpd:/usr/sbin/nologin
sync:x:5:0:sync:/sbin:/bin/sync
shutdown:x:6:0:shutdown:/sbin:/sbin/shutdown
halt:x:7:0:halt:/sbin:/sbin/halt
mail:x:8:12:mail:/var/spool/mail:/usr/sbin/nologin
operator:x:11:0:operator:/root:/usr/sbin/nologin
games:x:12:100:games:/usr/games:/usr/sbin/nologin
ftp:x:14:50:FTP User:/var/ftp:/usr/sbin/nologin
nobody:x:65534:65534:Kernel Overflow User:/usr/sbin/nologin
dbus:x:81:81:System Message Bus:/usr/sbin/nologin
apache:x:48:48:Apache:/usr/share/httpd:/sbin/nologin
tss:x:59:59:Account used for TPM access:/usr/sbin/nologin
systemd-coredump:x:998:998:systemd Core Dumper:/usr/sbin/nologin
systemd-networkd:x:192:192:systemd Network Management:/usr/sbin/nologin
systemd-oomd:x:997:997:systemd Userspace OOM Killer:/usr/sbin/nologin
systemd-resolved:x:193:193:systemd Resolver:/usr/sbin/nologin
systemd-timesyncd:x:996:996:systemd Time Synchronization:/usr/sbin/nologin
qemu:x:107:107:qemu user:/sbin/nologin
polkitd:x:114:114:User for polkitd:/sbin/nologin
avahi:x:70:70:Avahi mDNS/DNS-SD Stack:/var/run/avahi-daemon:/sbin/nologin
geoclue:x:995:994:User for geoclue:/var/lib/geoclue:/sbin/nologin
nm-openconnect:x:994:993:NetworkManager user for OpenConnect:/sbin/nologin
usbmuxd:x:113:113:usbmuxd user:/sbin/nologin
gluster:x:993:992:GlusterFS daemons:/run/gluster:/sbin/nologin
rtkit:x:172:172:RealtimeKit:/proc:/sbin/nologin
pipewire:x:992:990:PipeWire System Daemon:/run/pipewire:/usr/sbin/nologin
saslauthd:x:991:76:Saslauthd user:/run/saslauthd:/sbin/nologin
chrony:x:990:989:chrony system user:/var/lib/chrony:/sbin/nologin
dnsmasq:x:989:988:Dnsmasq DHCP and DNS server:/var/lib/dnsmasq:/usr/sbin/nologin
rpc:x:32:32:Rpcbind Daemon:/var/lib/rpcbind:/sbin/nologin
rpcuser:x:29:29:RPC Service User:/var/lib/nfs:/sbin/nologin
openvpn:x:988:987:OpenVPN:/etc/openvpn:/sbin/nologin
nm-openvpn:x:987:986:Default user for running openvpn spawned by NetworkManager:/sbin/nologin
colord:x:986:985:User for colord:/var/lib/colord:/sbin/nologin
unbound:x:985:984:Unbound DNS resolver:/var/lib/unbound:/sbin/nologin
abrt:x:173:173:/etc/abrt:/sbin/nologin
flatpak:x:984:982:Flatpak system helper:/usr/sbin/nologin
/etc/passwd
```

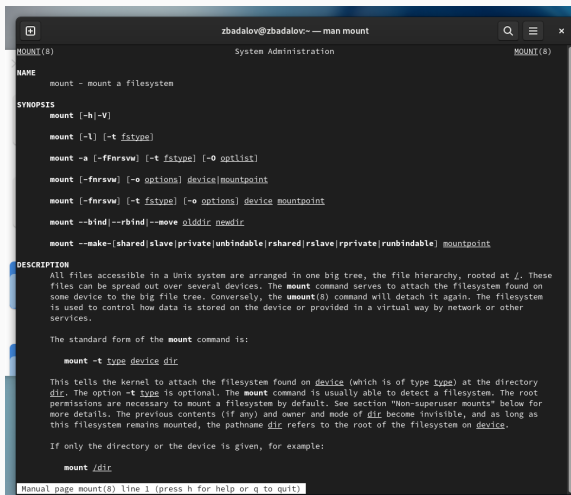
Рис. 6: Файл /etc/passwd

Работа с файлами и правами доступа



```
zbadalov@zbadalov:~  
zbadalov@zbadalov:~$ cp feathers file.old  
zbadalov@zbadalov:~$ mv file.old play  
zbadalov@zbadalov:~$ mkdir fun  
zbadalov@zbadalov:~$ cp -R play fun/  
zbadalov@zbadalov:~$ mv fun play/games  
zbadalov@zbadalov:~$ chmod u-r feathers  
zbadalov@zbadalov:~$ cat feathers  
cat: feathers: Отказано в доступе  
zbadalov@zbadalov:~$ cp feathers feathers2  
cp: невозможно открыть 'feathers' для чтения: Отказано в доступе  
zbadalov@zbadalov:~$ chmod u+r feathers  
zbadalov@zbadalov:~$ chmod u-x play/  
zbadalov@zbadalov:~$ cd play/  
bash: cd: play/: Отказано в доступе  
zbadalov@zbadalov:~$ chmod +x play/  
zbadalov@zbadalov:~$
```

Рис. 7: Работа с файлами и правами доступа



```
zbadalov@zbadalov:~ -- man mount
System Administration      MOUNT(8)

NAME
  mount - mount a filesystem

SYNOPSIS
  mount [-h|-V]

  mount [-l] [-t fstype]

  mount -a [-ffnrsvw] [-t fstype] [-O optlist]

  mount [-fnrsvw] [-o options] device|mountpoint

  mount [-fnrsvw] [-t fstype] [-o options] device mountpoint

  mount --bind|--rbind|--move olddir newdir

  mount --make-[shared|slave|private|unbindable|rshared|rslave|rprivate|runbindable] mountpoint

DESCRIPTION
  All files accessible in a Unix system are arranged in one big tree, the file hierarchy, rooted at /. These
  files can be spread out over several devices. The mount command serves to attach the filesystem found on
  some device to the big file tree. Conversely, the umount(8) command will detach it again. The filesystem
  is used to control how data is stored on the device or provided in a virtual way by network or other
  services.

  The standard form of the mount command is:

      mount -t type device dir

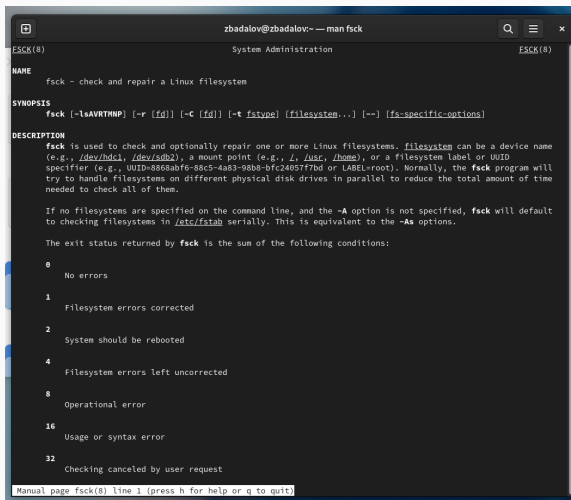
  This tells the kernel to attach the filesystem found on device (which is of type type) at the directory
  dir. The option -t type is optional. The mount command is usually able to detect a filesystem. The root
  permissions are necessary to mount a filesystem by default. See section "Non-superuser mounts" below for
  more details. The previous contents (if any) and owner and mode of dir become invisible, and as long as
  this filesystem remains mounted, the pathname dir refers to the root of the filesystem on device.

  If only the directory or the device is given, for example:

      mount /dir

Manual page mount(8) line 1 (press h for help or q to quit)
```

Рис. 8: Команда mount



```
zbadalov@zbadalov:~ — man fsck
System Administration
FSCK(8)

NAME
    fsck - check and repair a Linux filesystem

SYNOPSIS
    fsck [-lsAVRTnmp] [-r [fd]] [-C [fd]] [-t fstype] [filesystem...] [--] [fs-specific-options]

DESCRIPTION
    fsck is used to check and optionally repair one or more Linux filesystems. filesystem can be a device name
    (e.g., /dev/hdc1, /dev/sdb2), a mount point (e.g., /, /usr, /home), or a filesystem label or UUID
    specifier (e.g., UUID=8868abf6-88c5-4a83-98b8-bfc24057f7bd or LABEL=root). Normally, the fsck program will
    try to handle filesystems on different physical disk drives in parallel to reduce the total amount of time
    needed to check all of them.

    If no filesystems are specified on the command line, and the -A option is not specified, fsck will default
    to checking filesystems in /etc/fstab serially. This is equivalent to the -As options.

    The exit status returned by fsck is the sum of the following conditions:

    0      No errors

    1      Filesystem errors corrected

    2      System should be rebooted

    4      Filesystem errors left uncorrected

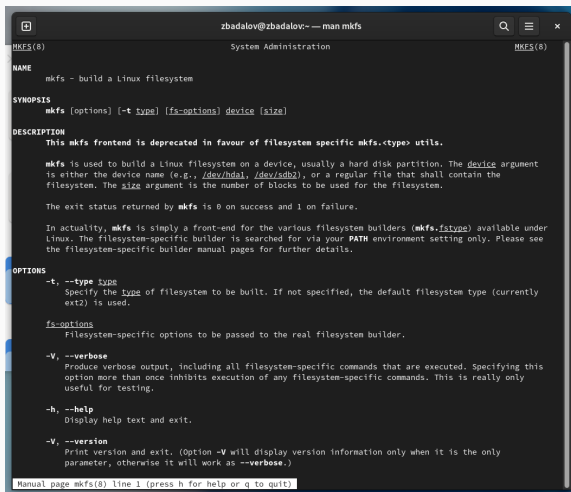
    8      Operational error

    16     Usage or syntax error

    32     Checking canceled by user request

    Manual page fsck(8) line 1 (press h for help or q to quit)
```

Рис. 9: Команда fsck



```
zbadalov@zbadalov:~$ man mkfs

MKFS(8)                                System Administration                MKFS(8)

NAME
    mkfs - build a Linux filesystem

SYNOPSIS
    mkfs [options] [-t type] [fs-options] device [size]

DESCRIPTION
    This mkfs frontend is deprecated in favour of filesystem specific mkfs.<type> utils.

    mkfs is used to build a Linux filesystem on a device, usually a hard disk partition. The device argument
    is either the device name (e.g., /dev/hda1, /dev/sdb2), or a regular file that shall contain the
    filesystem. The size argument is the number of blocks to be used for the filesystem.

    The exit status returned by mkfs is 0 on success and 1 on failure.

    In actuality, mkfs is simply a front-end for the various filesystem builders (mkfs.fstype) available under
    Linux. The filesystem-specific builder is searched for via your PATH environment setting only. Please see
    the filesystem-specific builder manual pages for further details.

OPTIONS
    -t, --type type
        Specify the type of filesystem to be built. If not specified, the default filesystem type (currently
        ext2) is used.

    fs-options
        Filesystem-specific options to be passed to the real filesystem builder.

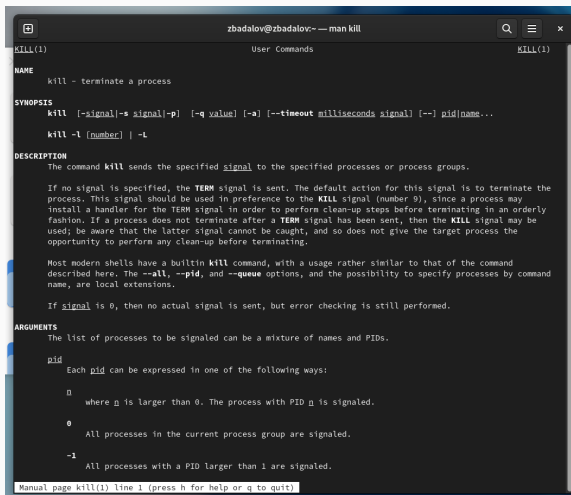
    -V, --verbose
        Produce verbose output, including all filesystem-specific commands that are executed. Specifying this
        option more than once inhibits execution of any filesystem-specific commands. This is really only
        useful for testing.

    -h, --help
        Display help text and exit.

    -V, --version
        Print version and exit. (Option -V will display version information only when it is the only
        parameter, otherwise it will work as --verbose.)

Manual page mkfs(8) line 1 (press h for help or q to quit)
```

Рис. 10: Команда mkfs



```
zbadalov@zbadalov:~ -- man kill
Kill(1)                                User Commands                                Kill(1)

NAME
    kill - terminate a process

SYNOPSIS
    kill [-signal|-s signal] [-p] [-q value] [-a] [--timeout milliseconds signal] [--] pid|name...

    kill -l [number] | -L

DESCRIPTION
    The command kill sends the specified signal to the specified processes or process groups.

    If no signal is specified, the TERM signal is sent. The default action for this signal is to terminate the process. This signal should be used in preference to the KILL signal (number 9), since a process may install a handler for the TERM signal in order to perform clean-up steps before terminating in an orderly fashion. If a process does not terminate after a TERM signal has been sent, then the KILL signal may be used; be aware that the latter signal cannot be caught, and so does not give the target process the opportunity to perform any clean-up before terminating.

    Most modern shells have a builtin kill command, with a usage rather similar to that of the command described here. The --all, --pid, and --queue options, and the possibility to specify processes by command name, are local extensions.

    If signal is 0, then no actual signal is sent, but error checking is still performed.

ARGUMENTS
    The list of processes to be signaled can be a mixture of names and PIDs.

    pid
        Each pid can be expressed in one of the following ways:

        0
            where n is larger than 0. The process with PID n is signaled.

        0
            All processes in the current process group are signaled.

        -1
            All processes with a PID larger than 1 are signaled.

Manual page kill(1) line 1 (press h for help or q to quit)
```

Рис. 11: Команда kill

Выводы по проделанной работе

В ходе данной работы мы ознакомились с файловой системой Linux, её структурой, именами и содержанием каталогов. Научились совершать базовые операции с файлами, управлять правами их доступа для пользователя и групп. Ознакомились с Анализом файловой системы. А также получили базовые навыки по проверке использования диска и обслуживанию файловой системы.